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New Species of Nitella belonging to the monoecious acuminatae Group, with a Review of the allied Species.

By T. F. Allen.

(Plates 285, 286.)

Nitella stellaris n. sp.

This plant is moderately branched, suberect, about 25 cm. high. The stems are about one mm. in diam.; verticils remote below, becoming crowded above, consist of eight leaves, spreading and even recurved. The lower sterile leaves, two to three cm. long, are once divided into two to four short terminals, the upper fertile leaves are once divided into two rarely three terminals. The terminals are one-celled, gradually acuminate, 180 to 250 μ diam. at the middle, and, in the upper verticils, 700 to 1400 μ long. The oögonia are aggregated to the node of the leaf. The antheridia are about 215 in diam. The oöspore 230 to 240 long by 225 broad, with five or six sharp ridges, *its membrane quite smooth.* (Plate 285.)

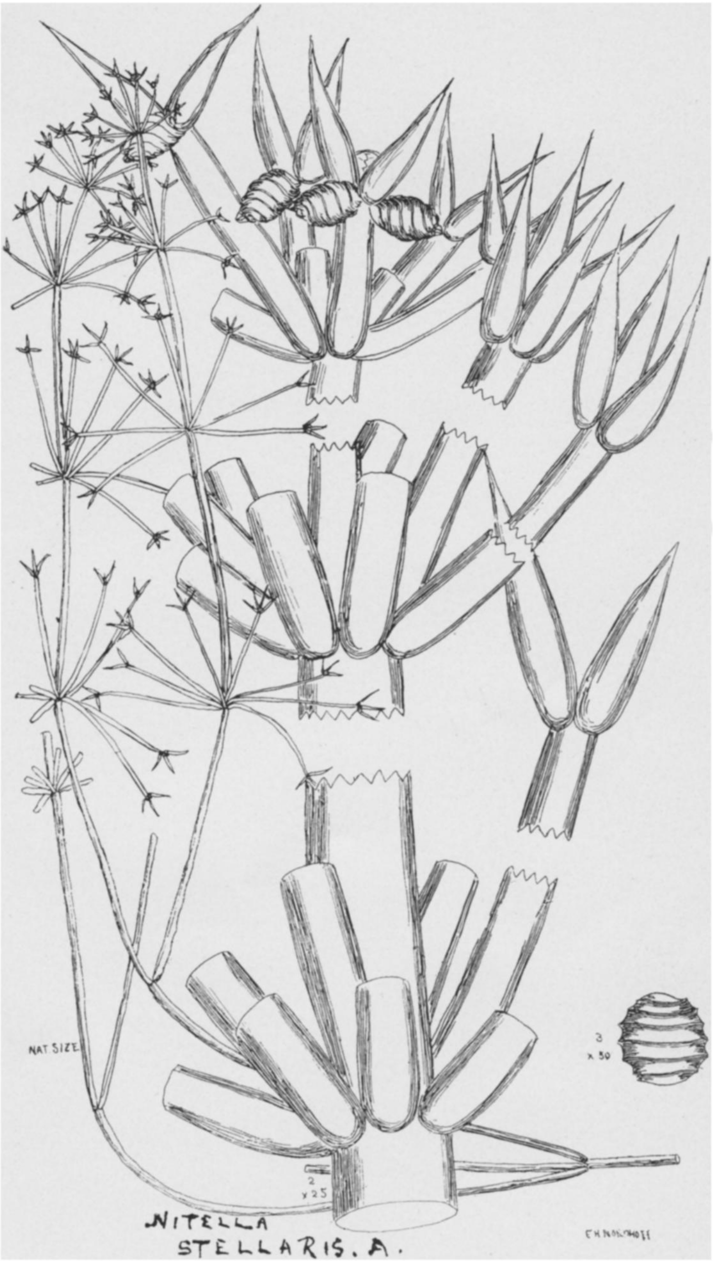
This species differs from *N. subspicata* Allen, by the diffuse character of its fertile verticils, less condensed than in that species, and in forms of the related species, *N. sub-glomerata* A. Br.; from the latter it may be distinguished by the membrane of the oöspore, and its general habit of growth. The proportionate length of the terminal to the primary segments of the leaves is generally as two to five.

The cluster of small leaves at the ends of the longish primary segments of the fertile leaves give a stellate appearance to the ends of the upper leaves and suggests the name; these, while scarcely "condensed," as the term is usually applied to fertile verticils of *Nitella*, are somewhat suggestive of approximating the "*subglomerata*" series of this group, of which this may stand as the most diffuse, followed by *capitulifera* A., *subspicata*, *subglomerata*, and culminating in *glomerulifera*, which bears a dense "head" of fertile divisions.

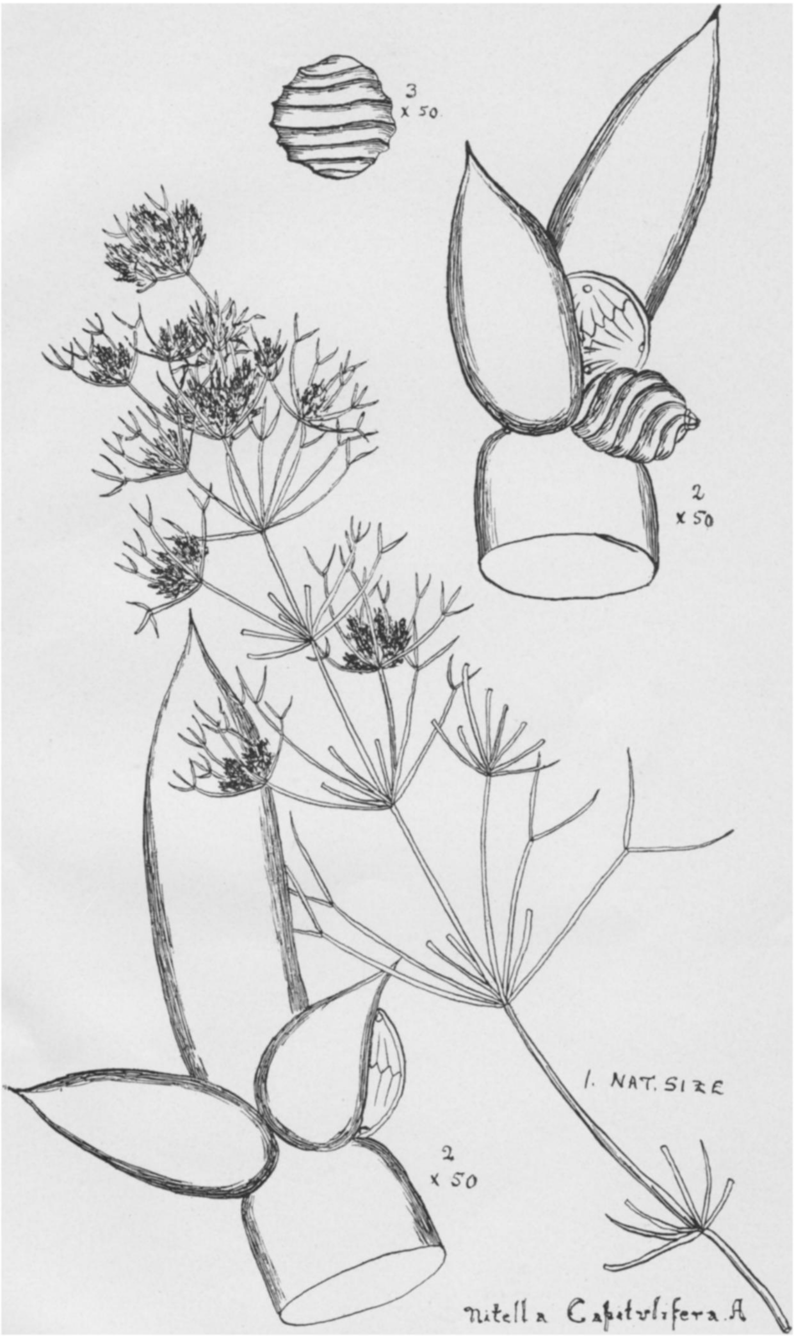
The plant was collected by Mr. J. W. Blankinship, in a pond near Verdigris river, Creek nation, Indian Territory, August 21, 1895.

Nitella capitulifera n. sp.

Plants diffusely branched, spreading, ten to fifteen cm. long. stem flaccid, about 700 in diam. Verticils consist of eight leaves,



NITELLA STELLARIS ALLEN.



NITELLA CAPITULIFERA ALLEN.

Leaves of the lower sterile verticils often simple, somewhat abruptly pointed; of the upper, once or even twice divided. First segment of the leaves 680 in diam., second 500, the terminals 320 to 340. The first segment nine-tenths the entire length of the leaf, the second segments usually terminal in sterile leaves, three to six, quite short (one tenth the length of the first segment). Fertile verticils *are usually somewhat condensed in small heads, quite similar to N. stellaris* A. The leaves are usually twice divided, the terminal segments, three to four in number, are quite unequal, generally with one, scarcely longer than broad, others six or more times as long, seeming to be somewhat inflated and not always very acuminate, often *somewhat apiculate.* Antheridia 240 in diam. Oögonia, one or two at a node, with oöspores 295 to 306 long and 272 broad, with *seven* prominent ridges. Membrane of the spore reddish, *quite smooth.* (Plate 286.)

This interesting species is similar to the American *sub-glomerata* in its general aspect, though apparently much smaller; its "capitulae" are much smaller and consist of small fertile verticils arising within the sterile verticils. It differs from *subglomerata,* also, by its more inflated terminals, which are usually quite short and unequal, as well as by the character of the oöspore. From *Bellangeri* (*acuminata* var. *Bellangeri* A. Br.) it is clearly distinct, though approaching that form in which the short terminal leaflets are described by Braun as "ventricosis, longe et acutissime acuminatis;" finally from all others of the *acuminatae* group except the preceding *stellaris* A. by the smooth membrane of the oöspore. From *N. stellaris* it differs by its more diffuse habit, its smaller stems and much larger and differently shaped terminals; its larger antheridia and oögonia. From *N. subspicata* A. it differs especially in its much smaller capitulae, the shape of terminal segments of the leaves and by its larger oöspores.

This plant was collected in Japan in 1895.

The "acuminatae" group as above amplified by these new species, may be classified as follows:

Monarthrodactylae, furcatae, homoeophyllae, gymnocarpae, monoicae, acuminatae.

† Sterile divisions not exceeding the fertile verticals.
(Series of *N. subglomerata* A. Br.)

* Oögonia isolated.

a. Divisions elongated.	*N. subglomerata* var. *Indica* A. Br.
b. Divisions abbreviated.	*N. Mauritiana* A. Br.

** Oögonia aggregated.

§ Terminal divisions elongated, much longer than the primary; oöspore 275 μ long, membrane reticulated. *N. subglomerata* A. Br.

§§ Terminals abbreviated, less than half as long as the primary divisions.

a. Terminals one-half to one-fifth the length of the primaries, oöspore 240 μ long. *N. stellaris* Allen.

b. Terminals unequal, scarcely more than one-tenth the length of the primaries, oöspore 300 μ long. *N. capitulifera* Allen.

†† Sterile divisions somewhat exceeding the contracted, fertile verticils; oöspore 225 μ long, membrane smooth. *N. subspicata* Allen.

††† Sterile divisions long overtopping the globular condensed, fertile verticils; oöspore 400 μ long, membrane coarsely granular. *N. glomerulifera* A. Br.

Internal Antidromy.

BY GEORGE MACLOSKIE.

Prof. W. J. Beal showed in the *American Naturalist* of 1873 that cones of opposite spirality grew on the same pine tree. Although for a time I failed to see matters in this way, I have, with the assistance, or rather the guidance, of Prof. G. L. Goodale, come to endorse all that Prof. Beal wrote; and furthermore, I find that the phyllotaxy as well as the conotaxy is two-fold on different parts of the same tree of the Coniferae. The branches of succeeding years appear to be often relatively antidromic, and also the side branches along one of the primary branches, and each cone appears to harmonize in its spirality with the branch which bears it, though there are apparent exceptions to this rule which may be due to the suppression of branches. Of course these phenomena cannot be observed in non-branching Gymnosperms, as the cycads, nor in tree ferns.

But in the London Natural History Museum I found a branching specimen of *Lepidodendron Sternbergii* (from Lanarkshire, Scotland) in which the leaf scars of stem and of one branch were dextrorse, whilst those of the other branch of the dichotomy were sinistrorse. This phenomenon strongly recalled the conditions of the forking rootstock of the water lily (*Nuphar*) and other plants.

The general outcome of these facts is that the law of antidromy is more complex than was first apparent; a result which